DEPARTMENT OF STATE LANDS

MARC RACICOT, GOVERNOR
P.O. BOX 201601

STATE OF MONTANA

(406) 444-2074
1625 ELEVENTH AVENUE
HELENA, MONTANA 59620-1601

March 22, 1994

Dear Reader:

Enclosed for your review is an Environmental Assessment (EA) prepared by the Department of State Lands (DSL). The EA evaluates a proposal of corrective measures by Zortman Mining Inc. to reconstruct a solution capture system in the Ruby Gulch drainage.

The decision may be to approve the proposal, deny the proposal, or approve the proposal with modifications.

Comments should be directed to Bob Winegar at 444-2074 or sent to:

Bob Winegar
Montana Dept. of State Lands
Capitol Station
Helena, MT 59601

Thank you for your time and consideration. Please call the Department of State Lands (444-2074) if you have any questions.

Sincerely,

Bob Winegar

Robert C. Winegar
Program Supervisor
Hard Rock Bureau
Reclamation Division

rhv

enclosure

STATE DOCUMENTS COLLECTION

JUN 22 1994

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1515 E. 6th AVE.
HELENA, MONTANA 59620

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CHECKLIST ENVIRONMENTAL ASSESSMENT

Company Name: Zortman Mining Inc. **Operating Permit #:** 00096 **Project:** Zortman Mine

Location: Sections 17, 18; T25N; R25E; MPM - Ruby Gulch drainage **County:** Phillips

BACKGROUND

The water quality in Ruby Gulch (figure 1-1) has deteriorated due to mining activity. As a corrective measure to increase the efficiency of contaminated solution capture downgradient from the facility, ZMI submitted a minor amendment to the operating plan dated November 23, 1993. This plan proposes to reslope/cap the '85/'86 dike, move/reconstruct a capture sump and reconstruct the '85/'86 cyanide contingency pond in Ruby Gulch. Material previously placed below the '85/'86 dike has been removed along with historic tailing located underneath. This material was believed to be a source for ARD and has been placed in the OK pit for interim storage. ZMI is currently developing an interim water treatment program for Ruby Gulch waters with the Water Quality Bureau. When these treatment plans are finalized, copies will be provided to DSL and BLM. The treatment plans will become part of the MMRA operating permit.

OPERATOR'S PROPOSED PLAN

Historic mine tailing located in Ruby Gulch would be excavated from the areas of construction and stored for use or disposal (figures T1 and T2). Estimated total volume of tailing scheduled for removal to complete the proposed plan is approximately 161,000 loose cubic yards.

The Zortman '85/'86 dike would be resloped from the top of the containment dike at 2H:1V slopes (figure R1). A 4-foot thick limestone underdrain would be constructed at the base of the dike on bedrock. On top of this would be 10 feet of, less than 0.2 weight percent total sulfur waste rock (low* sulfur waste rock). The remainder of the dike would be constructed with a combination of low sulfur waste rock sloped to 2H:1V slope. On top of the low sulfur waste rock would be a 12-inch clay cap, then 12 inches of low* sulfur waste rock, and 12 inches of soil cover (figure R2). Final revegetation would take place as required under operating permit # 00096.

The primary solution capture and collection structures are the slurry cutoff walls and the capture sump. The existing capture system would be moved downstream to the toe of the resloped '85/'86 dike. Construction of the capture sump would occur within current disturbances. The capture sump would be constructed in bedrock, with an underdrain, once the tailing has been removed from the area. A slurry cutoff wall would be placed in bedrock, upgradient from the sump, to increase the efficiency of effluent capture (figure C1). Material for construction of the slurry wall would come from the Seaford Clay Pit. This sump would be approximately 200 feet long and 10 feet deep and accommodate approximately 1,000,000 gallons of fluid. The dike for the sump would have a 20-foot width and internal and external slopes of 2H:1V. Material for construction of the dike would come from the bedrock located in the area or would be supplemented by low* sulfur waste rock. A 12-inch layer of compacted clay would be added and the sump would be lined with 36 mil Hypalon liner. To prevent erosion of the dike face in the event of pump failure, a lined overflow system would be incorporated into the downstream face of the dike.

In addition to the slurry cutoff walls and capture sump, there would be a new cyanide contingency pond. The pond is provided to ensure there is sufficient capacity to handle added volumes of drainage during storm surges or pump failure. The existing Zortman '85/'86 cyanide contingency pond would be reconstructed downstream of the capture facility, The pond would be constructed in bedrock with an underdrain once the tailing has been removed. One to two slurry cutoff walls would be placed immediately upgradient of the contingency pond at the bedrock and soil interface to increase the efficiency of effluent capture (figure C1). The contingency pond would be approximately 410 feet long and up to 30 feet deep and would accommodate approximately 5,000,000 gallons of fluid. The dike for the contingency pond would be 30 feet wide and would have internal and

*** low = less than 0.2 weight percent total sulfur**

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https://archive.org/details/environmentalas1994mont_3

external slopes constructed to 2H:1V. Material for construction of the dike would come from the bedrock located in the area or would be supplemented by low* sulfur waste rock. The contingency pond would be lined exactly like the capture sump.

Captured solution would be pumped to the process circuit, used in the process circuit, or treated and discharged upon approval of the treatment plant design by the Water Quality Bureau. The water treatment plant is being designed to accommodate a maximum treatment rate of approximately 2500 gallons per minute. During construction of the contingency pond, wells RG-108 and RG-109 would be relocated downstream. A contingency pumpback well would also be placed downgradient from the contingency pond.

Ancillary facilities associated with the new capture sump and contingency pond would be limited to a service road, solution return lines and pumps, and possibly an electrical building at each location (figure F1).

As mentioned, a 4-foot thick limestone underdrain is proposed for the resloped '85/'86 dike. Limestone would be obtained from a limestone quarry of 3.01 acres located entirely on private ground. The limestone quarry could provide approximately 10,000 to 70,000 tons of limestone for use in the underdrain system. Prior to quarrying, the area would be stripped of 2 to 4 feet of soil which would be stockpiled in the '82 soil stockpile area. The quarry would advance into the hillside beginning at the current scarp on the east side and would be no larger than the area shown on figure L1. The excavations for the quarry would be 20 feet deep with the quarried material being Paleozoic limestone and shale. Current mining and reclamation procedures approved under operating permit #00096 would be followed. The excavated quarry scarp would be resloped to 3H:1V or less.

PROPOSED PLAN WITH MITIGATION

This alternative is being proposed to improve water quality below existing facilities in Ruby Gulch. The operator would proceed with its proposed plan using the mitigation developed for this alternative. ZMI would remove and stockpile all tailing material located between the capture sump and the new contingency pond so that all tailing material excavated would be placed above the high water elevation to prevent sediment loading to Ruby Gulch. During construction best management practices would be implemented to restrict sediment load to the Gulch due to construction activities.

The resloping and capping of the '85/'86 dike face would not be approved until further environmental analysis can be completed in an EIS process. The slurry cutoff wall and associated capture sump would be placed far enough downstream from the existing dike face to accommodate a 2.5H:1V reslope of the '85/'86 dike.

The proposed contingency pond would not be used for cyanide contingency. The new contingency pond, proposed to be located downgradient of the proposed capture sump, would operate as an ARD surge pond during large, intense storm events. Since the existing '85/'86 cyanide contingency pond is located on top of the existing dike face and is fully functional, the existing cyanide contingency pond would remain in use until an EIS can be completed to evaluate the effects of resloping and capping the 85'/'86 dike face.

All slurry cutoff walls would be constructed in bedrock to reduce the risk of failure caused by large storm events, not on the bedrock/soil interface. Instead of 3 slurry cutoff walls, two larger walls would be constructed in bedrock spanning the drainage entirely, one above the capture sump and one above the ARD surge pond. If feasible a standardized method or device would be constructed or used to measure flow rates into and out of each capture facility.

It is uncertain whether or not low* sulfur waste rock is non-acid generating. Because of this, mitigation would include mandatory use of pit-run amphibolite, limestone, shale, and/or dolomite with a total sulfur content of less than 0.2 weight percent from existing mining areas. These materials have more neutralizing capacity than the volcanic fraction of the pit-run waste and would supplement materials needed to construct the solution capture system instead of limestone excavated from an undisturbed area. Underdrain systems would be constructed out of limestone from an existing quarry.

Relocated water monitoring wells RG-108 and RG-109 would be given new numbers to designate that they had been moved. If feasible some standardized method or device to measure surface water flow rates would be used at all respective surface water monitoring

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*** low = less than 0.2 weight percent total sulfur**

sites located downgradient of the capture facilities. Flow rates would be measured each time the operational monitoring schedule specifies.

EXISTING ENVIRONMENT

The Ruby Mill has been designated as an historical site and is located directly above the proposed construction in Ruby Gulch drainage. Large amounts of tailing material, produced by the mill and historically placed in Ruby Gulch, are contributing large sediment loads downgradient during intense storm events. The tailing material has been geochemically characterized and found to be chemically inert. This material has been used in the past as a protective layer placed on top of leach pad liners to protect them from puncture. The material serves as a good source for road gravel during the winter months.

The downstream portion of the '85/'86 dike was removed because it was believed by the operator to be a source for the ARD found in Ruby Gulch. Since that portion of the '85/'86 dike was removed, the underdrain for the '85/'86 leach pad has performed well. Fluids are passing beneath the pad unimpeded. The pad has not exhibited any failures and is structurally sound. Water quality has not improved substantially since the removal of the suspect material. Other sources could be precipitation and infiltration through (figure 1-1) the OK and Mint pits, the Ruby Gulch Waste Repository, the '85/'86 leach pad foundation, and/or the materials used in the leach pad underdrain.

Most of the waste available for use in constructing the new solution capture system is amphibolite. There is very little pit-run shale, dolomite or limestone available for use. To better define the risk involved with using this material for construction, 3 samples of amphibolite waste with a total sulfur content ranging from less than 0.01 to 0.19 weight percent were tested. It has been demonstrated (ZMI, 1992), in a 20-week test using three humidity cells, that these amphibolite samples generate very little acid and that sulphate production decreases after 13 weeks of testing. These results indicate that there is very little acid producing sulfur in this category of amphibolite and that any acid that is produced is neutralized. Levels of metals in leachates collected from the amphibolite test cells were low. Aluminum, cadmium, copper, iron, manganese, and zinc were tested for. Most metals were below detection limits and none exceeded any water quality standards.

Flow rates in the Ruby Gulch drainage averages approximately 100 gallons per minute (gpm). During intense storm events, flow rates can increase up to approximately 2200 gpm. The existing capture facility downgradient of the '85/'86 dike consists of a pumpback well, a holding tank, and a pump which returns captured solution to the process circuit. This system has been functioning intermittently since mid-May 1993. The system has succeeded in intermittently reducing the volume of ARD which is released to Ruby Gulch by circulating these solutions to the process circuit. During intense storm events, the solution capture system is overwhelmed and ARD is lost to the drainage. A water treatment system is being designed to provide capacity for holding and treating these intense storm events. Currently ZMI's process circuit, with a maximum capacity of 452.05 million gallons for both the Landusky and Zortman mines, operates at approximately 61 percent capacity. As of March 7, 1994 there was 279.18 million gallons in the circuit with 172.87 million gallons available capacity (Attachment 1).

The existing cyanide contingency pond is located on top of the '85/'86 dike crest. This pond has functioned well in the past and does not need revision at this time.

The limestone proposed to be quarried is located in an area which has not been disturbed. The outcrop faces the town of Zortman and is visible from the town.

IMPACTS ASSOCIATED WITH THE ALTERNATIVES CONSIDERED

Alternative 1 - No Action:

The impact to water quality under the No Action Alternative would be similar to that which is currently being experienced at the site which is continued acid, metals, and sulfate loading to Ruby Gulch.

*** low = less than 0.2 weight percent total sulfur**

Alternative 2 - Proposed Plan:

Due to the uncertainty in predicting the reactivity of pit waste rock, especially the volcanic fraction, the resloping and capping of the '85/'86 dike as submitted could result in additional acid, metals, and sulfate loading to Ruby Gulch.

Alternative 3 - Proposed Plan with Mitigation - Agency Preferred Alternative:

The only action that would take place under this alternative is construction of the solution capture system in an area of existing disturbance. Impacts to water quality have already been documented. Under the proposed plan with the mitigation listed above, impacts to water quality would be decreased by reducing acid, metals, and sulfate loading downstream. This plan would reduce risks to health and safety by allowing for the capture and return of potentially contaminated water. More accurate flow measurements would better define the mass loading downstream. Improvement to water quality further downgradient would be demonstrated by ongoing water quality monitoring. This plan would be re-evaluated as a part of a comprehensive water management and treatment plan in the forthcoming Zortman/Landusky EIS. At that time the agencies may further modify the actions required.

IMPACTS ON THE PHYSICAL ENVIRONMENT

RESOURCE	[Y/N] POTENTIAL IMPACTS AND MITIGATION MEASURES N = Not present or No Impact will occur. Y = Impacts may occur
1. GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE: Are soils susceptible to compaction, fragile, or unstable? Are there unusual geologic features? Are there special reclamation considerations?	[Y] (See discussion under "PROPOSED PLAN WITH MITIGATION")
2. WATER QUALITY, QUANTITY AND DISTRIBUTION: Are important surface or groundwater resources present? Is there potential for violation of ambient water quality standards, drinking water maximum contaminant levels, or degradation of water quality?	[Y] (See discussion under "PROPOSED PLAN WITH MITIGATION")
3. AIR QUALITY: Will pollutants or particulate be produced? Is the project influenced by air quality regulations or zones (Class I air-shed)?	[N]
4. VEGETATION COVER, QUANTITY AND QUALITY: Will vegetative communities be significantly impacted? Are any rare plants or cover types present?	[N]
5. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS: Is there substantial use of the area by important wildlife, birds or fish?	[N]
6. UNIQUE, ENDANGERED, FRAGILE OR LIMITED ENVIRONMENTAL RESOURCES: Are any federally listed threatened or endangered species or identified habitat present? Any wetlands? Species of special concern?	[N]
7. HISTORICAL AND ARCHAEOLOGICAL SITES: Are any historical, archaeological or paleontological resources present?	[Y] (See discussion under "EXISTING ENVIRONMENT")
8. AESTHETICS: Is the project on a prominent topographic feature? Will it be visible from populated or scenic areas? Will there be excessive noise or light?	[Y] (See discussion under "PROPOSED PLAN WITH MITIGATION")

* low = less than 0.2 weight percent total sulfur

9. DEMANDS ON ENVIRONMENTAL RESOURCES OF LAND, WATER, AIR OR ENERGY: Will the project use resources that are limited in the area? Are there other activities nearby that will affect the project?	[Y] (See discussion under "CUMULATIVE EFFECTS")
10. IMPACTS ON OTHER ENVIRONMENTAL RESOURCES: Are there other studies, plans or projects on this tract?	[Y] (See discussion under "CUMULATIVE EFFECTS")

IMPACTS ON THE HUMAN POPULATION

RESOURCE	[Y/N] POTENTIAL IMPACTS AND MITIGATION MEASURES
11. HUMAN HEALTH AND SAFETY: Will this project add to health and safety risks in the area?	[Y] (See discussion under "PROPOSED PLAN WITH MITIGATION")
12. INDUSTRIAL, COMMERCIAL AND AGRICULTURAL ACTIVITIES AND PRODUCTION: Will the project add to or alter these activities?	[N]
13. QUANTITY AND DISTRIBUTION OF EMPLOYMENT: Will the project create, move or eliminate jobs? If so, estimated number.	[N]
14. LOCAL AND STATE TAX BASE AND TAX REVENUES: Will the project create or eliminate tax revenue?	[N]
15. DEMAND FOR GOVERNMENT SERVICES: Will substantial traffic be added to existing roads? Will other services (fire protection, police, schools, etc) be needed?	[N]
16. LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS: Are there State, County, City, USFS, BLM, Tribal, etc. zoning or management plans in effect?	[N]
17. ACCESS TO AND QUALITY OF RECREATIONAL AND WILDERNESS ACTIVITIES: Are wilderness or recreational areas nearby or accessed through this tract? Is there recreational potential within the tract?	[Y] (See discussion under "CUMULATIVE EFFECTS")
18. DENSITY AND DISTRIBUTION OF POPULATION AND HOUSING: Will the project add to the population and require additional housing?	[N]
19. SOCIAL STRUCTURES AND MORES: Is some disruption of native or traditional lifestyles or communities possible?	[N]
20. CULTURAL UNIQUENESS AND DIVERSITY: Will the action cause a shift in some unique quality of the area?	[N]
21. OTHER APPROPRIATE SOCIAL AND ECONOMIC CIRCUMSTANCES:	[N]

CUMULATIVE EFFECTS

Previously, ZMI has been approved to relocate their access road which is currently located on tailing historically deposited in Ruby Gulch. Removal of additional tailing material would decrease the amount of sediment loading currently experienced downgradient of the construction sites. There are recreational areas nearby. The removal of a substantial amount of tailing material would improve the visual aspects of the drainage.

*** low = less than 0.2 weight percent total sulfur**

MAGNITUDE AND SIGNIFICANCE OF POTENTIAL IMPACTS

Reduced acid, metals, and sulfate loading to Ruby Gulch would be demonstrated by ongoing water monitoring below the capture sump and ARD surge pond. No significant adverse impacts would result from the implementation of this plan as mitigated in Alternative 3. Further environmental review of the '85/'86 dike reslope and cap would indicate whether or not significant impacts would result from that part of the proposed plan.

RECOMMENDATIONS AND FURTHER ENVIRONMENTAL ANALYSIS:

Alternative 3 is recommended. The construction of the slurry cutoff walls, capture sump, and the ARD surge pond would be recommended only if mitigation listed above is stipulated. Further modification of this plan may be required due to decisions which will be forthcoming regarding the Zortman Expansion EIS.

[X] An EIS level of analysis should be conducted to demonstrate whether or not the capping scenario for the '85 dike will be adequate to restrict acid generation and provide for successful revegetation. Investigation into the sources for the ARD in Ruby Gulch should be included in the EIS analysis.

[ ] More detailed EA

[X] No further analysis is needed for the construction of the slurry cutoff walls, capture sump, and the ARD surge pond if mitigation listed in Alternative 3 is followed.

PUBLIC INVOLVEMENT

Public involvement includes various notices and hearings which were conducted in connection with the Zortman Expansion EIS and the recently published Landusky EA. The public has been and will be involved in the EIS process for the ARD corrective measures at the Zortman/Landusky mines. Public comment was received and issues were addressed in this Environmental Assessment. Since the recommended alternative would only involve construction in an area of existing disturbance it does not warrant another public comment period.

OTHER GOVERNMENTAL AGENCIES WITH JURISDICTION

Bureau of Land Management, Montana Water Quality Bureau, Environmental Protection Agency, and the Army Corp of Engineers.

REFERENCES

ZMI, 1992. Application for Amendment to Operating Permit No. 00096, Zortman Mining Inc., Phillips County, Montana, Vol 6, Appendix 12, revised April 5, 1993.

EA Checklist
Prepared By: Rebecca A. Miller (Name) Geochemist (Title)

Approved By: Robert C. Winegar (Name) Program Manager (Title)

Robert C. Winegar (Signature) 3/22/94 (Date)

ATTACHMENT 1 ATTACHMENT 1

ZORTMAN MINING INC.
PROCESS METALLURGICAL
PAD AND POND SOLUTION INVENTORY

TO: FRANCIS KOLCZAK DATE: March 7, 1994

FROM: MICHAEL WILSON

LANDUSKY PADS:	# Sprays	PAD RDG. FEET	SOLN. IN PAD	SOLN. IN CIRC.	TOTAL SOLN.	REMAINING CAPACITY
Land 83	0	14.9	2.77	0	2.77	7.80
Land 84	0	28.0	1.22	0	1.22	8.33
Land 86	0	34.3	10.85	0.00	10.85	11.94
Land 87	278	80.5	51.03	3.78	54.81	60.90
Land 91	1,251	72.0	80.18	43.51	123.70	29.92
LAND. PAD TOTAL (Million Gallons):			146.05	47.29	193.34	118.88

LANDUSKY PONDS:	POND RDG. FEET	SOLN. IN POND	REMAINING CAPACITY
Preg	7.5	3.86	1.10
Barren	5.6	3.87	0.73
Up. Cont.-Emerg. Pond	67.0	0.00	7.43
Low. Conting.	44.7	0.00	3.00
87 Storage Pond A	5.5	23.58	3.52
87 Storage Pond B	4.8	24.57	3.12
LAND. POND TOTAL (Million Gallons):		55.89	18.90
LANDUSKY TOTAL (Million Gallons):		249.23	137.78

ZORTMAN PADS:	# SPRNKLRS	PAD RDG. FEET	SOLN. IN PAD	SOLN. IN CIRC.	TOTAL SOLN.	REMAINING CAPACITY
Zort 83	0	21.3	5.19	0.00	5.19	3.58
Zort 84	0	18.0	0.73	0.00	0.73	9.64
Zort 85	0	29.0	7.00	0.00	7.00	6.88
Zort 89 Dump/Spr	116	30.0	5.95	0.72	6.67	10.77
ZORT. PAD TOTAL (Million Gallons):			18.86	0.72	19.58	30.87

ZORTMAN PONDS:	POND RDG. FEET	SOLN. IN POND	REMAINING CAPACITY
Preg	13.0	3.14	1.65
Barren	7.3	3.72	1.02
82 Conting.	12.0	3.52	1.54
ZORT. POND TOTAL (Million Gallons):		10.38	4.22
ZORTMAN TOTAL (Million Gallons):		29.96	35.09

ZORTMAN/LANDUSKY TOTALS: (Million Gallons)		SOLN. IN INVENTORY	REMAINING CAPACITY
	PADS:	212.92	149.75
	PONDS:	66.27	23.11
	TOTAL:	279.18	172.87

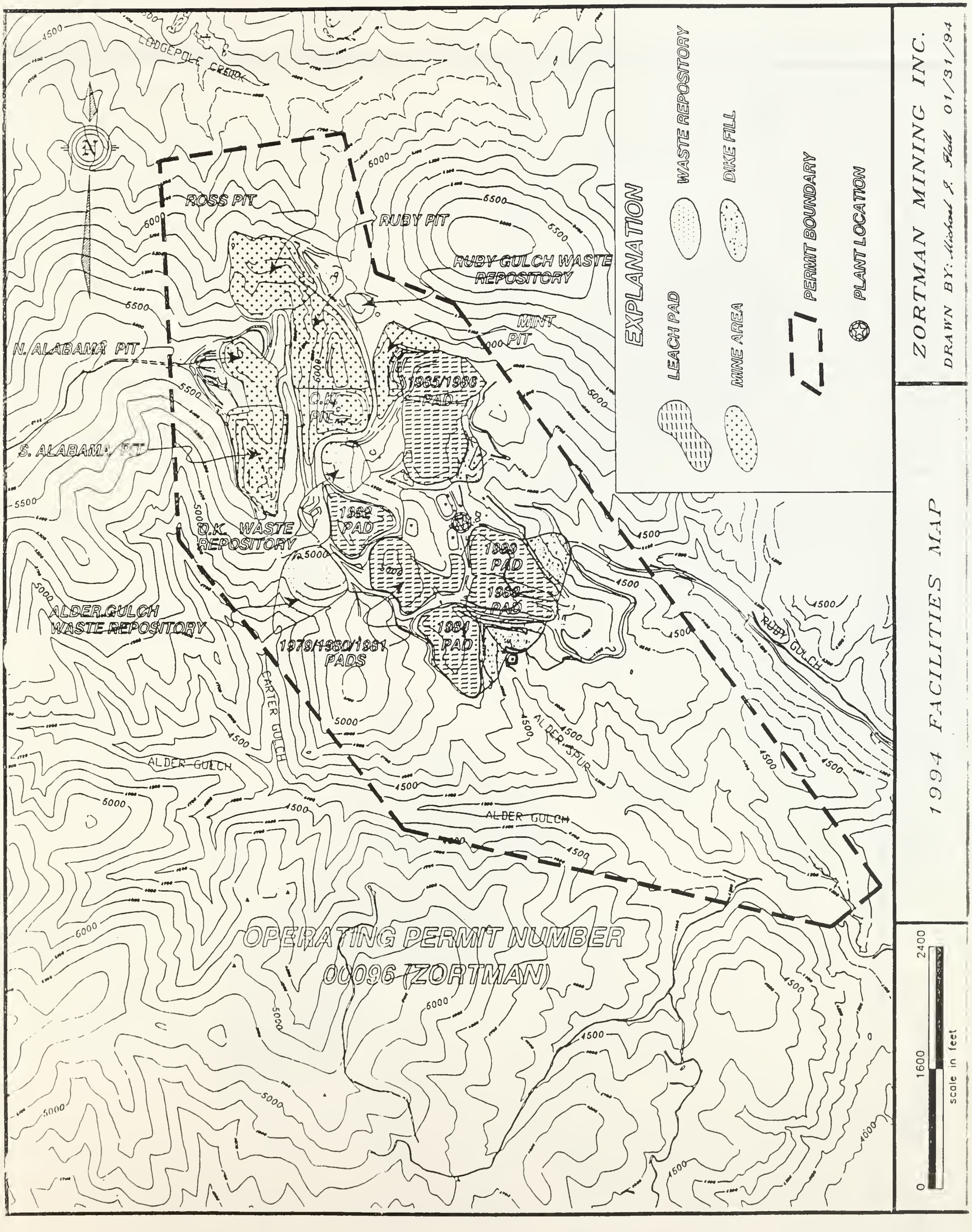

ZORTMAN MINING INC.
DRAWN BY: Michael J. Hall 01/31/94
1994 FACILITIES MAP
0
1600
2400
scale in feet
EXPLANATION
LEACH PAD
WASTE REPOSITORY
MINE AREA
DIKE FILL
PERMIT BOUNDARY
PLANT LOCATION
N
LODGEPOLE CREEK
ROSS PIT
RUBY PIT
RUBY GULCH WASTE REPOSITORY
MINT PIT
N. ALABAMA PIT
S. ALABAMA PIT
O.K. PIT
1985/1986 PAD
1982 PAD
O.K. WASTE REPOSITORY
1989 PAD
1983 PAD
1984 PAD
ALDER GULCH WASTE REPOSITORY
1979/1980/1981 PADS
CARTER GULCH
ALDER GULCH
ALDER SPUR
RUBY GULCH
OPERATING PERMIT NUMBER 00096 (ZORTMAN)
4000
4500
5000
5500
6000
6500

Figure 1-1

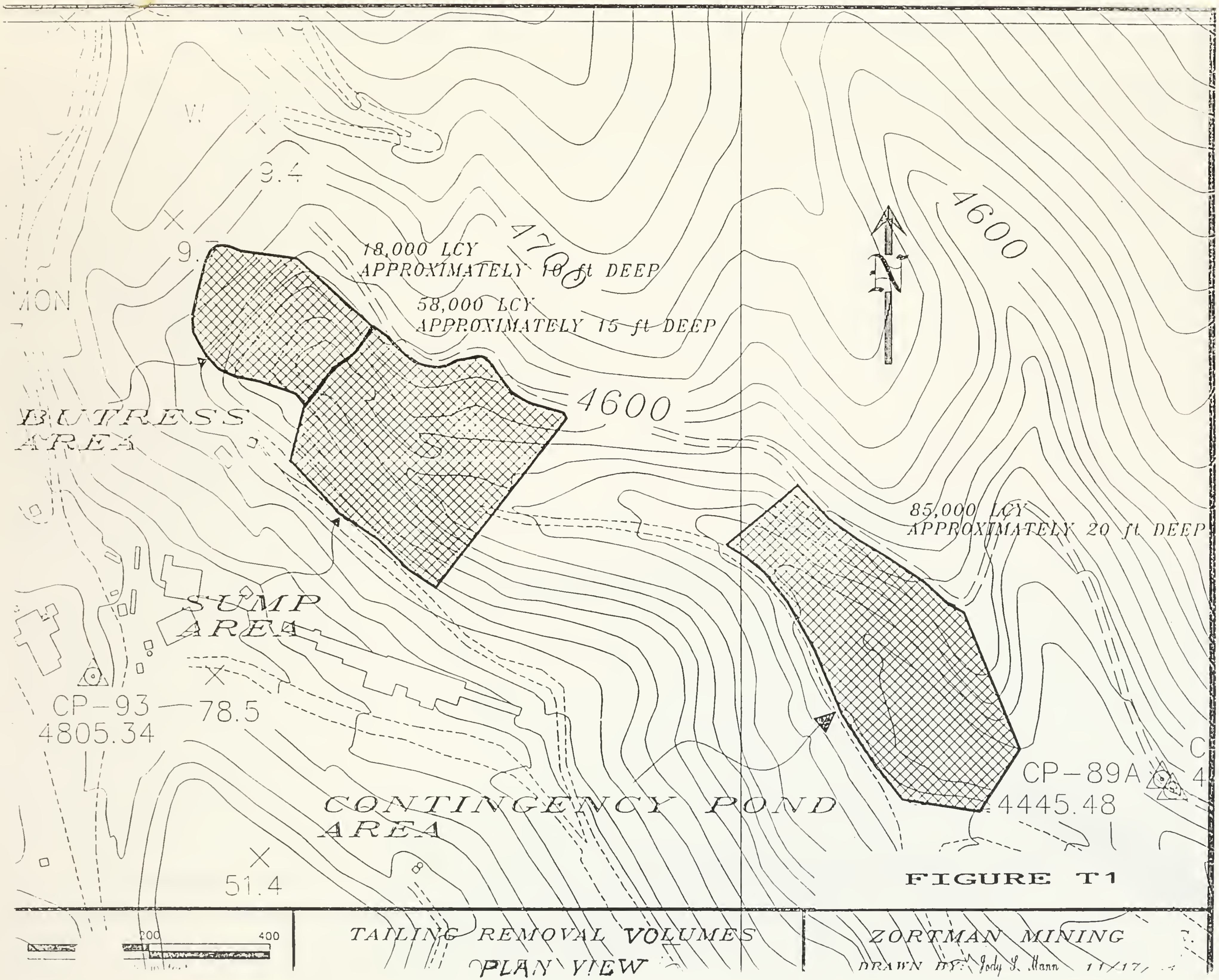


FIGURE T1

TAILING REMOVAL VOLUMES
PLAN VIEW

ZORTMAN MINING
DRAWN BY: Jody S. Mann 11/17/

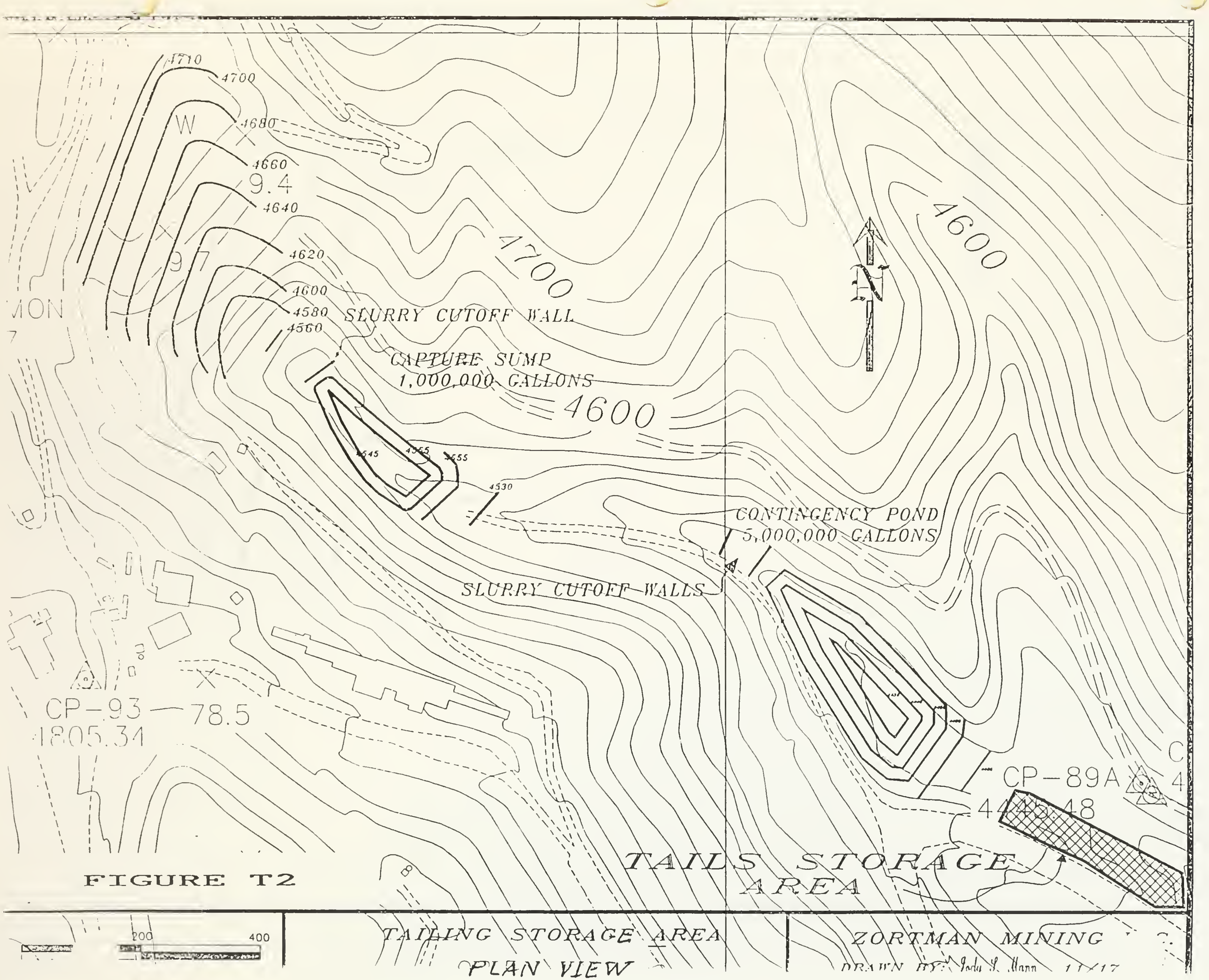

4710
4700
4680
W
4660
9.4
4640
9.7
4620
4600
4580
4560
MON
SLURRY CUTOFF WALL
4700
CAPTURE SUMP
1,000,000 GALLONS
4600
4545
4555
4555
4530
4600
CONTINGENCY POND
5,000,000 GALLONS
SLURRY CUTOFF WALLS
CP-93
1805.34
78.5
CP-89A
4445.48
C
4
TAILS STORAGE
AREA
200
400
TAILING STORAGE AREA
PLAN VIEW
ZORTMAN MINING
DRAWN BY: Jody L. Mann 11/17

FIGURE T2

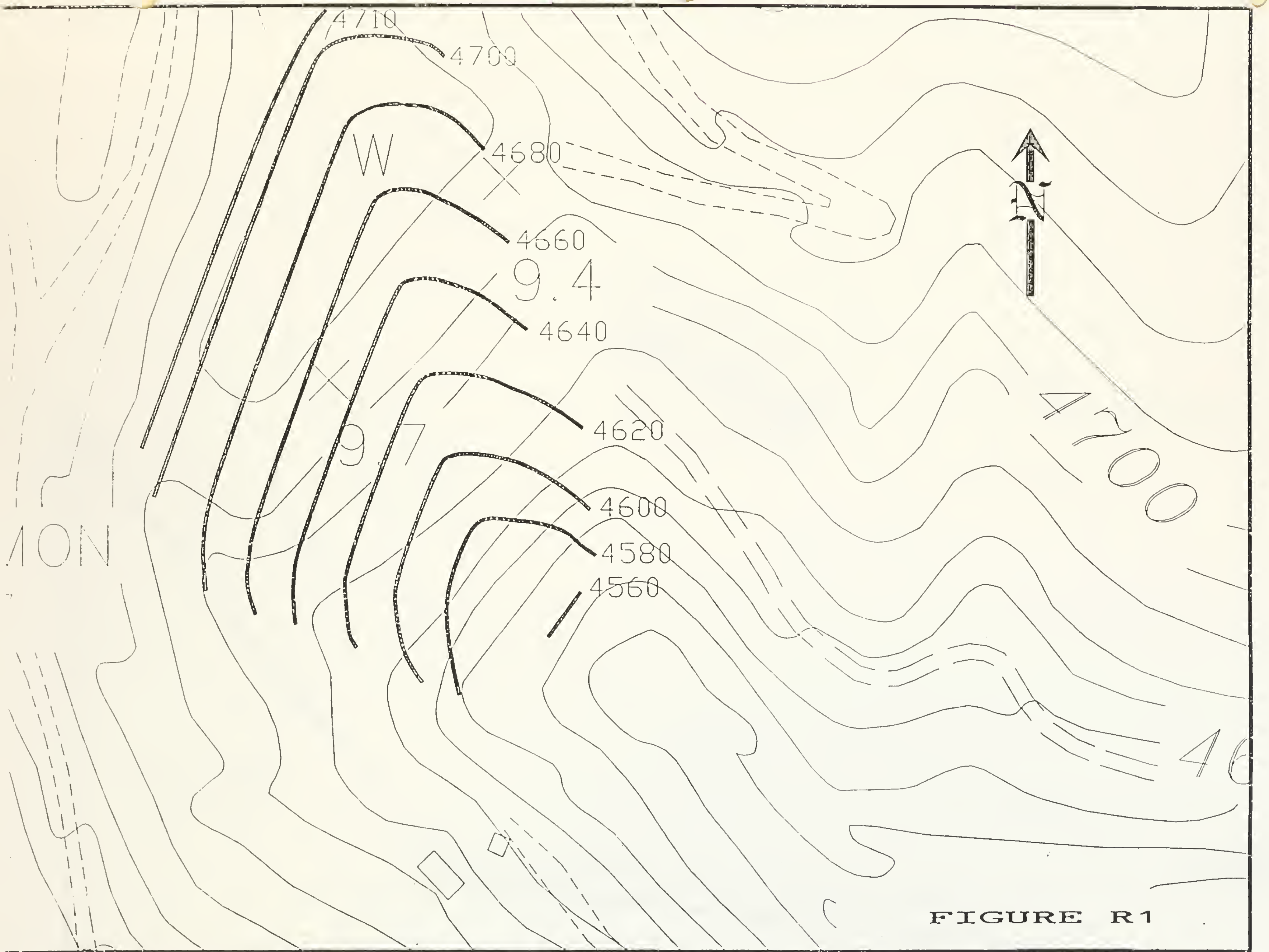
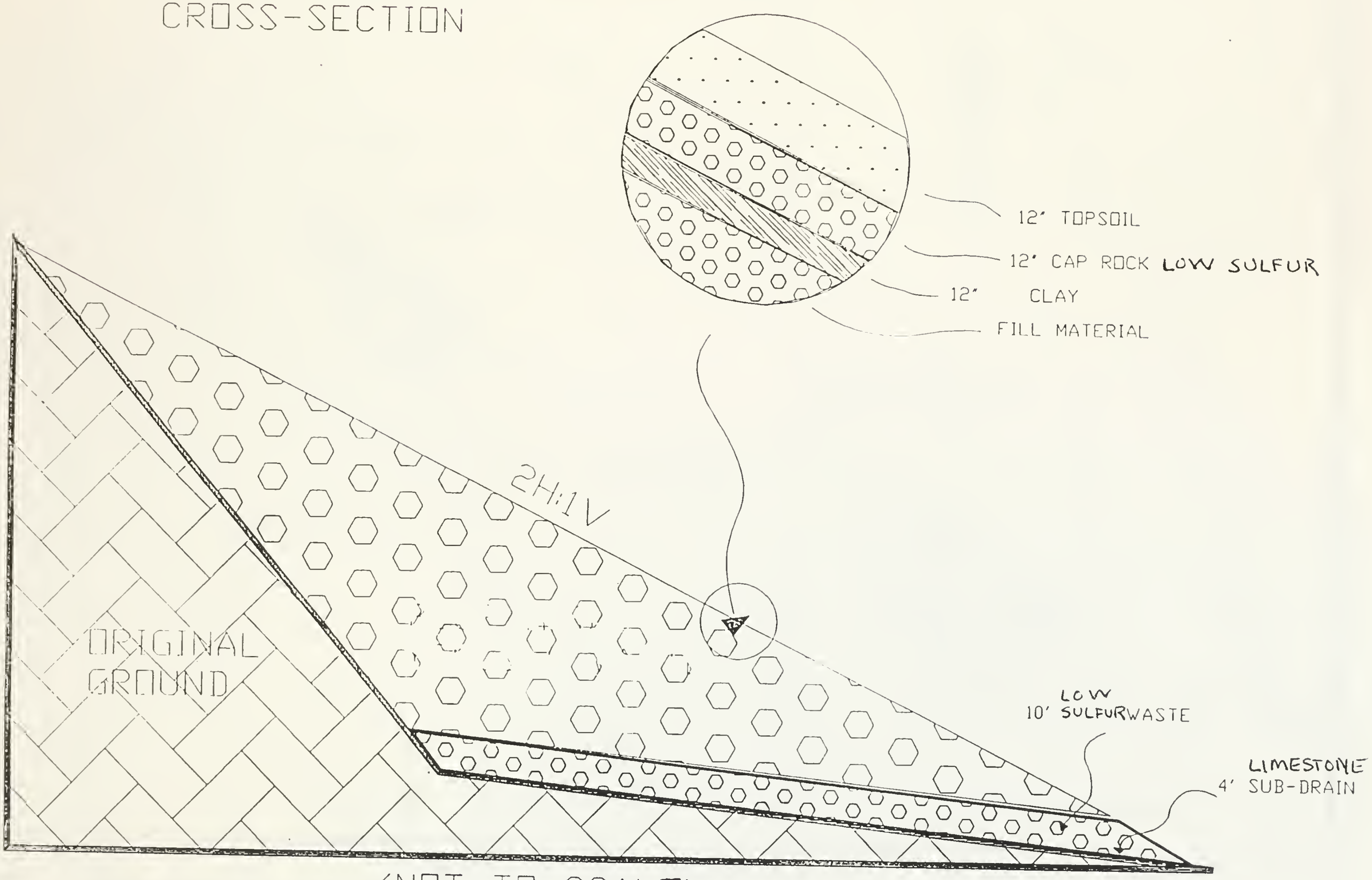


FIGURE R1

ZORTMAN '85 DUMP FACE
PLAN VIEW OF RESLOPE

ZORTMAN MINING
DRAWN BY: [illegible]

ZORTMAN '85 DIKE FACE
RECLAMATION PLAN
CROSS-SECTION



(NOT TO SCALE)

FIGURE R2

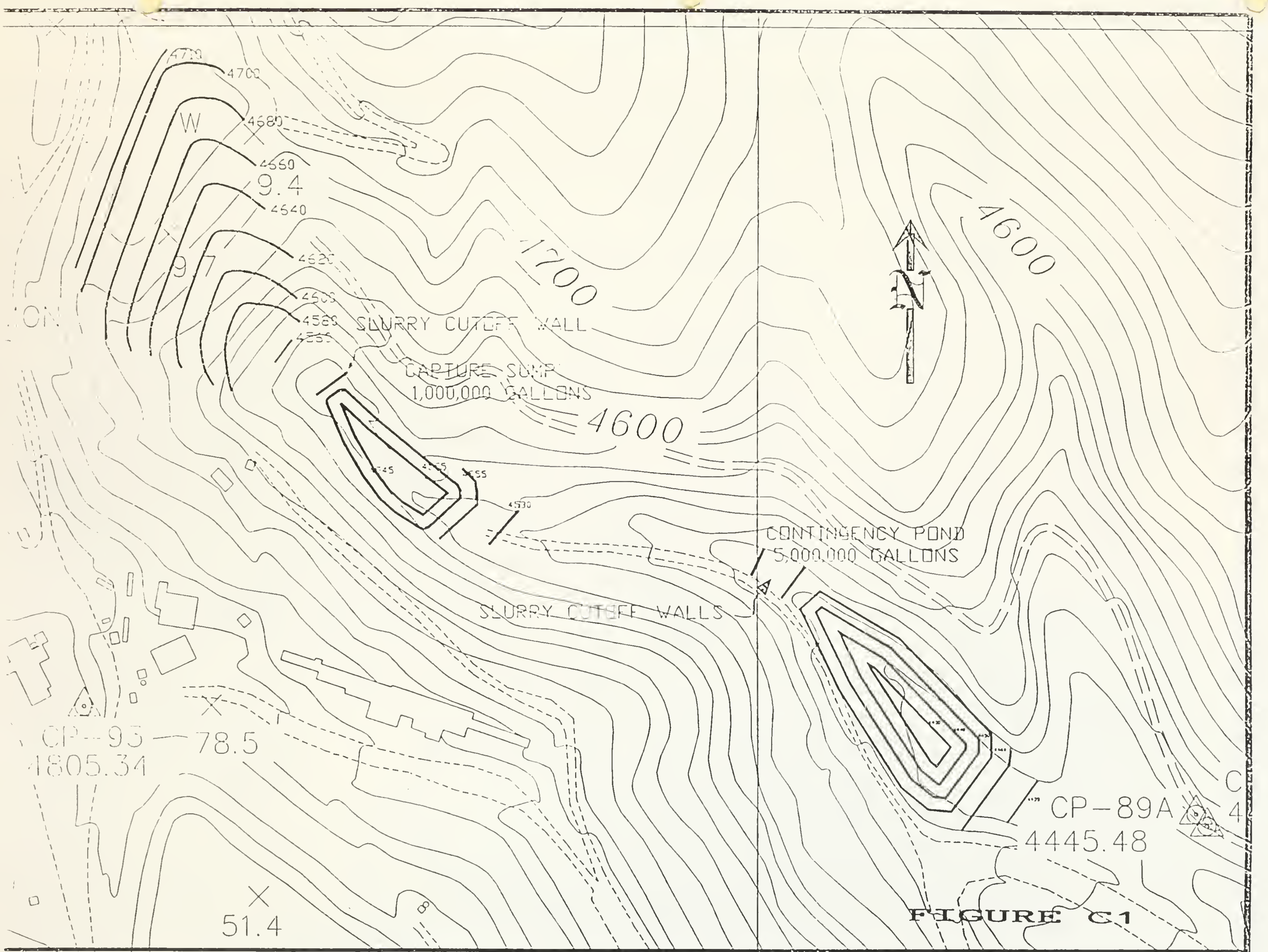


FIGURE C1

CONTINGENCY POND
PLAN VIE

ZORTMAN MINING

DRAWN BY: Jody L. Mann 06/25,

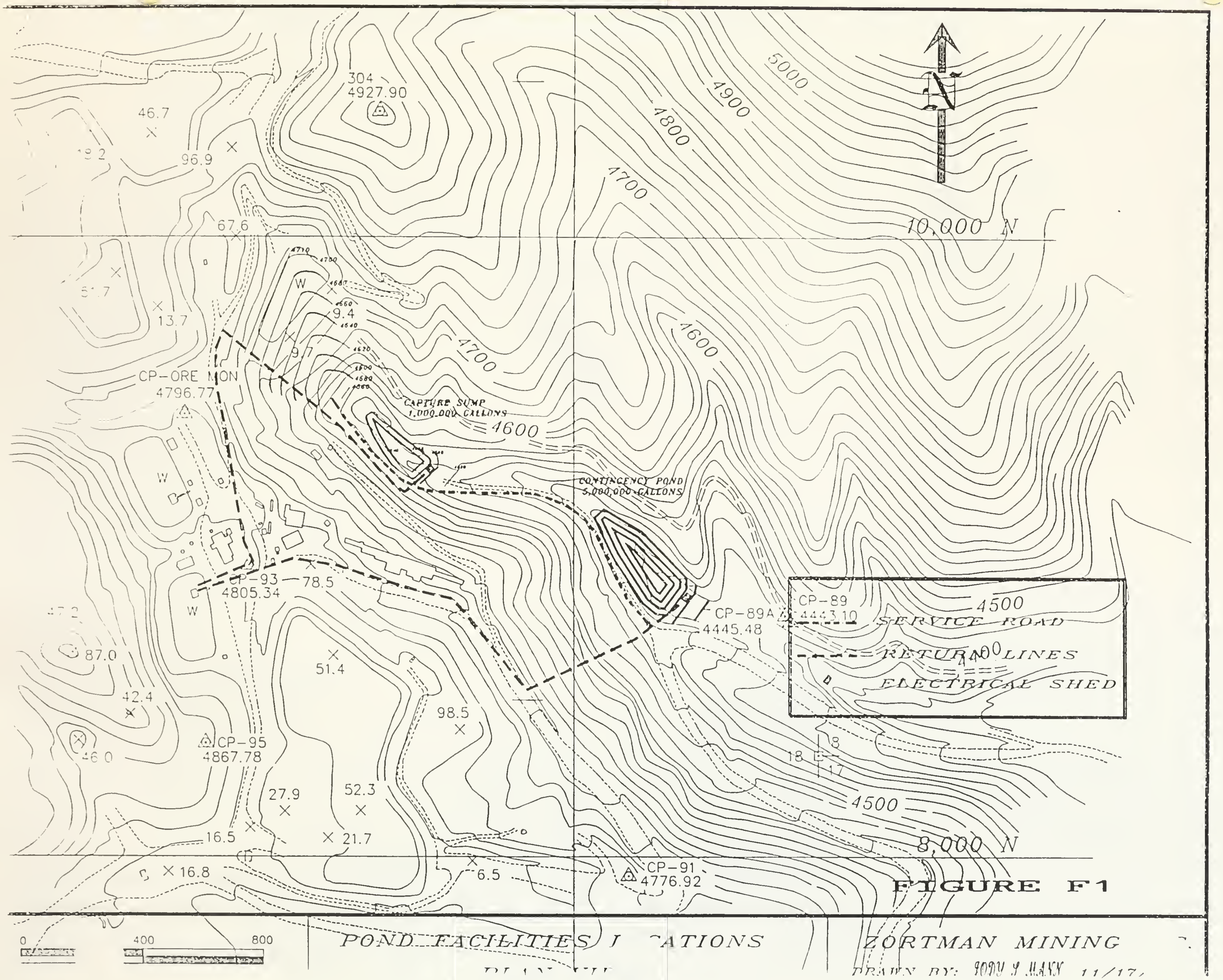


FIGURE F1

POND FACILITIES LOCATIONS

ZORTMAN MINING

DRAWN BY: JODY J. MANN 11/17/

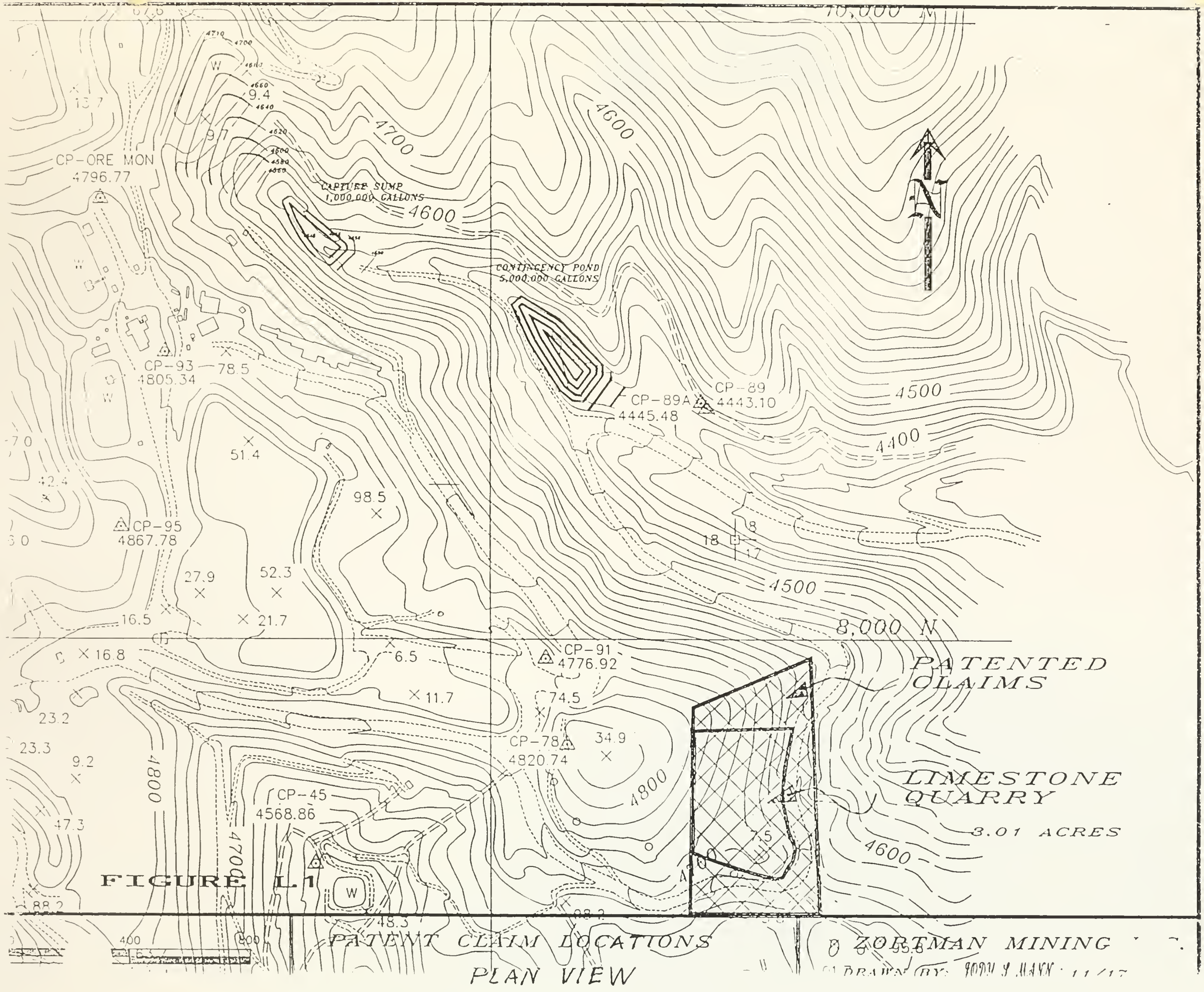


FIGURE L.1

PATENT CLAIM LOCATIONS
PLAN VIEW